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INTERSTATE ADVISORY COMMITTEE
on the
SUSQUEHANNA RIVER BASIN

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PENNSYLVANIA
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BACKGROUND INFORMATION RELATING TO THE SUSQUEHANNA BASIN SURVEYS AND INTERSTATE ADVISORY COMMITTEE

DOCUMENTS SECTION

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THE RIVER AND ITS BASIN

At its official source the Susquehanna river is a small creek flowing out of the south end of Otsego Lake at Cooperstown, New York. At its mouth it sweeps wide and deep into the head of Chesapeake Bay.

Between the two extremes, the river takes on many aspects and is many things to the more than three million people who call it home. In New York State the river and its tributaries flow though a pleasant rolling countryside that was molded and shaped by the advance and retreat of the ice in the last Glacial Period. It is mostly rural country, but dotted here and there by urbanized areas such as Binghamton, Elmira, Corning, Hornell, Cortland, Norwich and Oneonta. The Binghamton area is among the more prosperous and fast growing parts of the basin.

The river basin sprawls over nearly half of Pennsylvania. The North Branch traverses the scenic beauty of the Endless Mountains before it heads into the anthracite coal region and past the towns of the Wyoming Valley. Those communities are struggling to overcome hardships caused by their being born in an area that for generations was almost wholly dependent upon an industry that by its nature is bound to destroy itself. While hard coal was coming out of the ground in huge volume the valley prospered. When the veins began to peter out or become inaccessible, the jobs and the steady income began going, too. The Wyoming and Lackawanna valley communities, where for more than a century anthracite was king, are working hard to bring in diversified industries and businesses to fill the places that were vacated, and to heal the wounds left on the land and in the river's water by King Coal.

The West Branch subbasin has also felt the hand of adversity because of dwindling resources that long gave the region its principal economic support. The first resource to be depleted was the magnificent

original forest. This, however, is a self-renewing resource, and under good management the great timberlands of north central Pennsylvania can and will return to high productivity. The other chief natural resource of the upper West Branch region is soft coal, and in many places streams have been polluted so badly by mine drainage that they may not return to full usefulness for generations. Yet much remains of beauty and worth; the valley supports thriving industrial and agricultural communities, and its recreation potential is outstanding.

The Juniata basin is similar in many respects to the West Branch. Coal is still being mined in its upper reaches, and the economy is based largely on its minerals, light industry, agriculture and outdoor recreation.

Down the main stem of the river its character changes greatly - and its valley does, too. Here the stream is broad - nearly a mile wide in some places - with many shallow reaches, and islands covered with vegetation. Agriculture takes on more importance - and some south central Pennsylvania farmlands are among the most valuable and productive in the United States. The manufacturing and distributing triangle formed by Harrisburg, York and Lancaster is growing fast.

Maryland's Susquehanna takes on the aspect of an inland sea rather than a river. From the Conowingo power dam to the head of the bay is only about eight miles - but the influence of the river's flow is strongly felt for at least another forty miles - all the way to the Bay Bridge near Annapolis. Flood flows from the Susquehanna push the saltier Bay water back toward the sea. And in times of drought, when river flow is low, the saline waters of the lower bay creep

closer to the upper reaches of the Chesapeake. This influences all the rich aquatic resources of the bay. Since much of the economy of Maryland is centered upon the Chesapeake, Maryland has a tremendous stake in the future of the Susquehanna.

From headwaters to mouth, the Susquehanna traverses a greatly varied countryside. The resources are different, and the people have differing viewpoints and outlooks. But they are all bound together by the little creek that flows out of Otsego Lake in New York and gathers unto itself waters from more than 27,000 square miles of New York, Pennsylvania and Maryland before it eventually merges with the tides of the Atlantic.

WHAT ARE THE COMPREHENSIVE SURVEYS?

Truly comprehensive surveys of the water and related land resources of a river basin are comparatively new. Until recent years, we in this country usually used a one-shot approach in our treatment of resources. We built a reservoir for a public water supply, or to try to reduce flood damage, or to create a place for fishing or boating. We built canals and lock-dam systems for navigation. We planted trees to reforest an area that had been clear cut by loggers or to put a vegetative cover on worn-out farmland. We encouraged erosion control to keep the farmlands productive. And so on.

Now, since we have learned more about how the things we do to one natural resource have inevitable effects on others, we try to plan for the best use of all the resources in a river basin. We have reached our present all-inclusive survey practice by trial-and-error; we have learned by experience.

In the present surveys of the Susquehanna basin, a combination of federal and state agencies, all having special skills and responsibilities, is collecting and analyzing information on nearly every conceivable aspect of the basin's natural and human resources. The water is being studied as to how much there is, whether it is polluted (and by what and how badly), where water is likely to be needed, and when, and how clean that water must be. Flood control is an important element. The present and future agricultural, forest and other economic conditions and needs of the people of the basin are being studied by specialists in those fields. Recreational facts are being gathered and evaluated, both as to what we have now and what we will need in coming times. Name any other resource important to man in the basin, and somewhere, some agency is giving it attention.

All the facts being gathered, and studied, are intended to form much of the foundation on which action plans for many years to come can be built.

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WHO ARE CARRYING OUT THE SURVEYS?

Seven principal agencies of the federal government and nearly two dozen agencies of the three states of New York, Pennsylvania and Maryland are involved in carrying out the comprehensive surveys of the Susquehanna River Basin.

The federal departments are the Army, Agriculture, Commerce, Health-Education-Welfare and Interior, the Federal Power Commission, and the Housing and Home Finance Agency. From one to four or more of the services and bureaus in these major agencies are active, each in its specialized field, working on facts relating to every square mile of the basin, from the headwater springs in the mountains, to the mouth of the river in Maryland where it flows into Chesapeake Bay. Parts of the bay itself are being studied, for the influence of the river is felt at least as far from its mouth as Annapolis.

The Corps of Engineers is the Army subdivision active in the surveys and has broad Congressional authority, primarily but not exclusively, in the field of flood damage prevention and control. The Public Health Service of the Department of Health-Education-Welfare is delving deeply into water quality matters, and economics related to water resources. The Soil Conservation Service, assisted by two sister agencies - Forest Service and Economic Research Service, all in the Department of Agriculture - is looking just as closely into resource factors centered in the tributary regions of the basin. Interior's Geological Survey has prime functions relating to the collecting and analysis of data on the surface and ground waters of the Susquehanna valley. Interior's Fish and Wildlife Service is mandated under federal law to examine carefully and to report on all phases of river basin activities that effect the resources under its jurisdiction. It also is conducting a special

study to determine whether salt water fishes that also use fresh waters can be restored to the Susquehanna despite the presence downriver of several hydroelectric power installations. Recreational planning in the basin is being given attention by the Department of Interior's Bureau of Outdoor Recreation, and the department's Bureau of Mines is concerned with coal resources and the water pollution that has resulted from coal extraction and processing. In the U. S. Department of Commerce the principal agencies taking part in the survey are the Weather Bureau, which has responsibilities, in conjunction with the states, regarding flood forecasting and related matters, and the Bureau of Public Roads through the federal aid highways program.

In the states, every agency that has resource responsibilities is either conducting studies on its own account, to be fed into the total collection of basic knowledge, or is answering requests from other agencies for special information.

The Interstate Advisory Committee on the Susquehanna is taking part also, by counseling with both the federal and the state agencies, by seeking out additional fields of study that might profitably be looked into by an appropriate federal or state agency, and by furnishing information useful to the survey agencies.

Surveying was started in 1962, and is expected to be completed in 1968 or 1969. The closing date will depend largely on the availability of funds to pay for the men, materials, and other things needed to complete this mammoth task.

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HOW ARE THE SURVEYS ORGANIZED?

With more than a dozen federal agencies, including their subdivisions, and about twice that many state departments and commissions working at their special jobs in gathering facts for the comprehensive surveys of the Susquehanna River Basin, things could get out of hand and end in confusion if there was no setup for pulling together and harmonizing their efforts. The Susquehanna River Basin Study Coordinating Committee is the mechanism being used for this purpose.

Its chairman is the District Engineer of the Army Corps of Engineers, whose office is in Baltimore, Md. It has members from the Departments of Agriculture, Commerce, Health-Education-Welfare, and Interior, from the Federal Power Commission, the Housing and Home Finance Agency, and from each of the basin states - New York, Pennsylvania and Maryland.

It so happens that the members from the three states are also the chairman and two vice-chairmen of the Interstate Advisory Committee on the Susquehanna.

The Coordinating Committee meets three times a year, in various places in the basin, to discuss progress of the comprehensive surveys and to chart activities for the future. These meetings are open to the press and the public. Questions may be asked of the members by persons present, and these are answered then and there, publicly.

Since the scope of the surveys is so broad, subcommittees and work groups were set up to coordinate significant parts of the total endeavor. There are subcommittees or work groups on recreation, hydrology, water quality, coal mine drainage, hydroelectric power, economics, and public affairs. These report publicly to the full Coordinating Committee at its meetings.

Thus everyone is helped to keep informed of what the others are doing, so the entire study can go forward smoothly and on time.

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THE INTERSTATE ADVISORY COMMITTEE - ITS FUNCTIONS

The Interstate Advisory Committee on the Susquehanna River Basin was organized by the three states the river flows through for one principal reason; to try to see to it that the basic interests of the states are safeguarded while the present water surveying goes on and afterward.

We have only one tool we can use in doing our job - gentle persuasion. We can't order people to do this or that; we haven't got and don't feel we should have that kind of authority.

About the time the federal government authorized comprehensive surveys of the basin's resources, New York, Pennsylvania and Maryland got together through their respective agencies for interstate cooperation. They agreed that a temporary but official body should be set up through which they could carry out a number of activities that would be to their mutual benefit.

One of these is to keep up a flow of communication between the states through the committee's membership, so each one is informed about matters of significance relating to the surveys.

Another function is to carry out studies on its own account, whenever the committee believes any subject of significance to the surveys is not a logical part of what the regular federal and state agencies are doing. Nearly a dozen such studies are going on at this time.

Still another is the production of a draft of an intergovernmental compact that can one day be laid before the lawmakers of the states and before Congress with a request that it be enacted into law. A task force of specialists is working on the big job of writing such a compact now.

One day the comprehensive surveys will be completed. They are expected to end in 1968 or 1969. If the compact is adopted, as is anticipated by the three states, an intergovernmental commission will come into being to undertake the coordination and supervision of an action program to be based, at least in major aspects, on the findings that result from the surveys.

Then the Interstate Advisory Committee on the Susquehanna River Basin will have completed its assignment and can be disbanded.

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THE PEOPLE OF THE INTERSTATE ADVISORY COMMITTEE

When the Interstate Advisory Committee on the Susquehanna River Basin was organized, it was decided that it should have people from both the Legislative and Executive Branches of the governments of New York, Pennsylvania and Maryland as its members. The presence of members of the Legislature helps assure that elected officials familiar with the survey and planning will be on the legislative floor when the time comes to consider laws to implement the program.

Likewise, the presence of high ranking officials of administrative departments assures that the legislators will have the benefit of the knowledge and skills in those departments as the basin survey goes along.

A member from each of the two houses of the Legislature in each state holds membership on the Interstate Advisory Committee. The New York members are Senator Elisha T. Barrett and Assemblyman Leo A. Lawrence. The Pennsylvania members are Senator Zehnder H. Confair and Representative Orville E. Snare. The Maryland members are Senator William S. James and Delegate Marvin Mandel.

The members from the executive branch of state government are: New York: Dr. Harold G. Wilm, Conservation Commissioner; and Ronald Peterson, First Deputy Commissioner of Commerce; Pennsylvania: Dr. Maurice K. Goddard, Secretary of Forests and Waters, who also is Chairman of the Committee; and John K. Tabor, Secretary of Commerce; Maryland: James J. O'Donnell, Director, State Planning Department; and Thomas Hatem, attorney and former state delegate.

William Voigt, Jr., conservationist and former executive director of the Pennsylvania Fish Commission, is executive director of the Interstate Advisory Committee. His technical assistant is Miss Eleanor E. Hanlon, former assistant professor of geography at Syracuse University.

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THE BASIN COMPACT - WHO IS WRITING IT?

Since one of its responsibilities is to produce a draft of an intergovernmental compact to set the guidelines for a long range program of water conservation and use in the Susquehanna Basin, the Interstate Advisory Committee assembled a team of specialists to write the draft.

The draft-writing subcommittee consists of six men, two each from New York, Pennsylvania and Maryland.

Its chairman is Dr. Frederick L. Zimmermann, professor of political science at Hunter College in New York City, who has a long and distinguished record of knowledge and achievement in the field of water resources law. The other member from New York is F. W. Montanari, assistant commissioner of conservation and director of its division of water resources.

The Pennsylvania members are Alan J. Sommerville, chief water development engineer, Department of Forests and Waters; and Robert J. Trace, assistant attorney general for the same department, who formerly was attorney for the Pennsylvania Sanitary Water Board.

The Maryland members are Dr. Carl N. Everstine, director of the state's Department of Legislative Reference, and Paul W. McKee, director of the Maryland Department of Water Resources.

This group will write at least one draft and eventually may write many drafts of a proposed compact before the Advisory Committee says "This looks all right; now let's lay it before the lawmakers for approval".

If or when a compact is ratified, it will become the law under which the water and related land resources of the Susquehanna River Basin will be conserved and developed and used for the long range benefit of all of its people.

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FLOOD CONTROL IN THE BASIN

Floods have plagued man from earliest times. They have washed out crops and swept away homes and businesses. Many lives have been lost because of high waters. Floods aren't new, and neither is flood damage, but as man's civilization has advanced and as he has complicated life and living with the things his brains and hands and tools have devised, the dollar costs of floods and the damage they do have gone up in proportion. Another reason flood costs are rising is that man hasn't kept himself and his developments out of the flood plains of our rivers. Man always has liked flood plains. The richest farm land is in the flood plain. The plain is relatively level; it is easier to build houses and factories and roads and railroads and airports in the flat country of a flood plain than to put them on a mountain top or a hillside. Rivers were our first inland highways of commerce, and our first primitive villages, then our modern towns and cities, were built on the river banks - in the flood plains.

The more valuable the developments man has built in the flood plains, the more insistently has he called upon government to protect his properties from flood waters. And government has responded. It has straightened rivers so high waters would flow faster toward the see and not be slowed down or backed up by natural meandering channels. It has built levees and walls--artificially raising the river's banks - so high waters wouldn't spread out over the country side. It has built dams - big ones and little ones - to hold back surplus waters until after the emergency has passed, when they may be gradually released to flow harmlessly to the sea.

In the comprehensive surveys now going on in the Susquehanna river basin, all these techniques for reducing floods and minimizing their

damaging effects, are bing studied and analyzed. No doubt all of them will be used, as they have elsewhere in the past, in our river basin in times to come, in ways and places judged to be best suited to the Susquehanna.

The two principal federal agencies with flood control responsibilities are the Army Corps of Engineers and the Soil Conservation Service. Although its authority has been extended far upstream by Congress, the Corps often confines its activities to the main river and its larger tributaries. The Soil Conservation Service operates in the smaller watersheds and subwatersheds. The Corps, working with larger rivers, tends to rely on clearing and straightening channels, on building levees and flood walls, and building sizable impoundments in order to reduce flood damage. The SCS, on the other hand, in its jurisdiction, likes the idea of stopping the raindrop where it falls, by so treating the earth that falling or melting water will soak into the ground until it can hold no more. A companion step, says the SCS, is to "make the water walk, not run, downhill" by terracing and contouring, and keeping plenty of dead leaves and other duff on top of the soil in woodlands. The next step is to build small dams in many places, so that in the aggregate they hold back their share of flood water that otherwise would rush down upon our cities and towns and croplands.

Both of these techniques are useful - each in its place - and both will no doubt be used in the Susquehanna basin program that grows out of the present comprehensive surveys.

When floods do strike, as they no doubt will at times in spite of protective works, flood stage forecasting - a joint federal-state activity - provides invaluable water level information to basin people.

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LOW WATER FLOW CONTROL IN THE BASIN

One of the subjects being studied in the comprehensive surveys of the Susquehanna River Basin is increasing low stream flow. This is just the opposite of flood control. In time of flood we have too much water and we try to hold some of it back by one means or another so it won't spill over the banks and get into people's homes and places of business. In time of drought we wish we had more water running down our stream channels.

There is only one known dependable way to augment low flow. This is to store water upstream in reservoirs, and to release it in measured quantities on a schedule that will get it downstream at the right time to the places where it is needed.

Increasing low flows can provide human benefits in a number of ways. It can assure adequate water for cities and industries. It can be used to dilute unavoidable pollution of our waters. It can be useful to pleasure and commercial boaters, and can improve living conditions for fish life. It can help agriculture through irrigation.

At the same time, we must remember that it is costly. Increasing the flow of a stream of any size requires a lot of water. It takes a million gallons of water to add one foot of depth to a three-acre pond, so it can readily be seen how many billions of gallons would have to be stored for release in order to raise the level of steady flow in the West Branch or the North Branch or the lower main stem of the Susquehanna by even two or three inches over any length of time.

Nevertheless, low flow augmentation is an appropriate subject for study in the course of the surveys, and it may be found practical and desirable to store a certain amount of surplus water in times when

stream flows usually are high, to be used down the river as needed in the usually dry late summer and early fall months. Summer is, of course, the height of the season when people like to go pleasure boating, water skiing and fishing, and if water taken out of a reservoir for a downstream use at that time reduces the level substantially, pleasure boaters, water skiiers and fishermen probably will be unhappy. Many things must be taken into consideration in coming to decisions as to whether low flow augmentation is to have a place in the long range program for the Susquehanna that will come out of the comprehensive surveys.

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WATER SUPPLY IN THE BASIN

Comparatively few communities in the Susquehanna basin use the river iteself for public water supply, though more will likely do so in in coming years. A more common practice is for municipalities, or the water companies that supply them, to build reservoirs on clean tributary streams, and pipe the water into town. Others use wells.

As the population and industry grow, and as water use increases in the Susquehanna valley, it is logical to expect that towns and cities will need more water than their present sources of supply can furnish. When that time comes, we can expect more communities to turn to the river for drinking water and water for the many other things we use it for today, in our homes, in our businesses, and in industry.

For this reason, when Congress authorized the present comprehensive surveys of the river basin, public water supply became one of the subjects to be studied. Where is it likely this will be needed in future years? How may it be included in plans for reservoirs to be built for other purposes such as flood control, pollution dilution and recreation? Will the water in such reservoirs be of high enough quality?

Another important question must be answered in connection with water supply obtained from federal reservoirs: How much will it cost the communities and the industries that expect to use the water? Public or industrial water supply can be included in the plans and designs of federal reservoirs - but under the law this can be done only on a reimbursable basis. The constructing agency - whether it be the Corps of Engineers or the Soil Conservation Service - must recover the cost of providing storage space for that water supply, though this can, of course, be done over a long term of years. Nevertheless, any community or industry that expects to use water from a federal reservoir must take into account how, and by whom, it will be paid for.

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FLOOD PLAIN PLANNING AND ZONING

Waterways and their adjacent flood plains have been important to Man since earliest times. The rivers were a water highway on which to move from place to place, and the lowlands had the richest soils to grow food. As civilization advanced, cities were built beside rivers to benefit from commercial boat traffic. People suffered damage when flood waters came, but until recent times they considered that a normal personal risk. The attitude was that there were certain business or other advantages in being down on the river bank that outweighed the losses from periodic high waters. They took a calculated risk.

As values of improvements in flood plains grew, the owners began calling on government to provide flood protection, to keep high water away from their doors. Government answered, and hundreds of millions of tax dollars have been spent on flood reducing works of many kinds. These include channel straightening so waters will flow faster toward the sea; levees and walls to keep flood water in river channels, out of built-up areas; and impoundments to hold back water until the danger of its going out of river banks has ended.

In recent years another school of thought has risen and is being followed widely across the country. There are people who ask why floods in all cases must be kept away from Man? Where it can still be done, why not keep Man away from floods? They are good questions, but the answers are not always simple. What is practical in an established, long settled riverfront town is one thing. What can be done in relatively open and undeveloped flood plain country is something else. There the people acting through their local planning agencies and local governments, can decide for themselves whether they want to run the risk of losing their property - or their lives - the next time the river

rises out of its banks and goes sweeping past their doors. The wiser course often is to set aside flood plain land for uses that are not likely to suffer very much - such as parking lots, playing fields of one kind or another, parks, or cropland.

Congress allots the Corps of Engineers a certain amount of money each year to be used in carrying out flood plain studies for local governments that ask for this kind of assistance. In recent times the appropriation has been approximately one million dollars a year. This has to be apportioned on a nationwide basis, but some of it can be made available for communities and counties in the Susquehanna basin if the local people ask for it.

The procedure is simple: The local unit of government makes application for flood plain planning help through the state agency that has been designated by the Governor to deal officially with the Corps of Engineers. In Pennsylvania this is the Department of Forests and Waters. In New York it is the Conservation Commission. In Maryland it is the State Planning Department. Any local government unit wishing to get in line for flood plain mapping and planning by the Corps of Engineers must agree that it will maintain any bench marks installed, but no other obligation of consequence is involved.

In addition, the federal Housing and Home Finance Agency, through its Section 701 planning program, is in position to help communities wishing to develop master plans that include attention to flood plains. In Maryland the State Planning Department is the agency through which this planning help is coordinated. In New York and Pennsylvania, it is done through the State Department of Commerce.

The Geological Survey also has mapped flood lines to help show the risk of improperly using bottomlands, and the Weather Bureau leads a federal-state forecasting activity of significance here and in flood control matters.

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WATER POLLUTION - GENERAL TYPES

Three major types of water pollution are of concern in the Susquehanna basin. They are municipal, industrial, and agricultural.

Agencies of all three basin states, and of the federal government, have pollution abatement and control responsibilities, and all are engaged in action programs seeking to keep the water quality situation in hand, to try to assure that the quality will be good enough to meet man's needs when and where he requires water.

Preventing new sources of municipal and industrial pollution from contaminating clean waters is probably the least of the problems that these agencies have to deal with. The laws on the books - both state and federal - are strong enough so conscientious administrators having jurisdiction can direct new housing developments and industries to install treatment facilities for their waste waters before they are occupied or go into business.

Old, long existing pollution sources are more difficult to cope with. They usually came into being before there were anti-pollution laws. Municipalities frequently are bonded to their legal debt limit and plead poverty as an excuse for delaying the installation of a sewage disposal plant. Industries often drag their feet, and fight for time, or ask to be allowed to install facilities that provide only partial treatment. Meantime, new processes stemming from modern chemical and other developments, create more treatment problems.

Slowly but steadily, the abatement authorities are reducing the water pollution a bit at a time, here there, everywhere. But it takes constant vigilance, and the help of the public, to keep pollution under control, to prevent new outbreaks and the aggravation of old, long existing conditions.

The worst pollution spots in the Susquehanna basin today are the Lackawanna and Wyoming valleys in the North Branch subbasin.

Communities in these areas are under orders from the Pennsylvania Sanitary Water Board to abate their municipal pollution. An authority has been devised for the Wyoming Valley, where fourteen communities have banded together and plan to construct one big treatment plant for all to use that is expected to go into operation in 1968 or 1969. The Housing and Home Finance Agency is assisting in this program. In the Lackawanna valley, a similar number of communities is trying now to draw up an acceptable plan for unified treatment; however, this does not seem likely to get into operation as soon as the Wyoming Valley plant.

In addition to these major areas of industrial and municipal pollution, there are several hundred other polluters whose waste waters contaminate tributaries and the main stem of the Susquehanna to some extent. It will take years, at the present pace of compliance with the law, before the existing water pollution situation is cleaned up on a basinwide basis. But it must be done; our growing population and increasing per capita use of water make it imperative that the quality of our basin's waters be kept high enough to meet modern needs. Cleansing the basin's streams, and keeping them clean, is a task that can't wait. The pace must be accelerated if tomorrow's requirements of all kinds for clean water are to be met.

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WATER POLLUTION FROM COAL MINES

The most troublesome single water pollution problem in the Susquehanna basin is that caused by drainage from coal mines - and it is almost exclusively a Pennsylvania problem. The Tioga river, a tributary of the Chemung river, carries Pennsylvania coal mine pollution north into New York State, with some ill effects, but by the time Susquehanna water reaches Maryland it has been so diluted and neutralized that it is in pretty good condition.

The principal pollutants from coal mines are sulfuric acid, iron and manganese. Sulfur is present in and near coal veins, and when this comes in contact with air and water sulfuric acid soon forms. The acid enters streams in seeps and constant or sporadic flows from hundreds upon hundreds of large and small coal mining sources, with damaging effect. It kills aquatic life, and water polluted by mine drainage is costly and difficult to treat for human or industrial use.

Worked out and abandoned mines are blamed for much of the coal country pollution, but a great deal also flows from mines that are in active operation. Some of these active mines were in existence before the present Pennsylvania Clean Streams Act was passed in 1945, and the law declared them exempt from treatment. In other cases, new mines have been opened with drainage to streams already badly polluted, and in these cases the operators were allowed to take out the coal without providing treatment. The remaining mine drainage pollution is from so-called "illegal" acid. That is, an operator accidentally or deliberately violates the law, and he may get away with it for a time before the law catches up with him.

It is easier to prevent the formation of mine drainage pollution than to treat it once it has been produced, and it often is easier to

cope with drainage from strip mines than from certain kinds of deep mines. Books have been written on this subject, as well as on ways of treating mine waste waters after they have become polluted. The most common method of treating acid water from coal mines is to neutralize it with lime, but this is not a simple process and creates new problems, such as producing a mineralized or hard water. The greatest problem, however, is that of treating the thousands of seeps and flows of polluted water that originate in abandoned mines whose owners are dead or departed, and who cannot be singled out and held responsible.

Many people - in government agencies, in university and other laboratories, and in private industry - are constantly studying the problem of mine drainage pollution. It is going on right now, as the present surveys of the waters of the basin are being carried out. New facts are being collected, new processes and variations of old procedures are being investigated, and we can hope that out of all the research and demonstration areas and pilot plants that are in being or in prospect, more and better ways of tackling this knotty problem will emerge.

One thing seems sure: Large regions in the Susquehanna river basin will be handicapped and damaged for years to come so long as coal mine drainage remains a problem.

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HYRROELECTRIC POWER AND THE SURVEYS

When Congress authorizes comprehensive surveys to be made of a river basin, it almost automatically includes hydroelectric power as one of the subjects to be studied. The idea of producing electric power as a byproduct of public water storage goes back to 1906, when the Bureau of Reclamation was authorized to include power generation in its irrigation projects out West. The first time it actually was done, however, was when the construction of Hoover Dam was ordered by Congress in 1928. Since then hydropower has frequently been included in western reservoir projects; it has been less common in the East up to now, but is one of the possibilities taken into consideration when multiple purpose impoundments are planned.

One of the reasons the power of water to generate electricity has not been fully employed in the Middle Atlantic States, in which our Susquehanna basin lies, has been the abundance of coal to burn in steam electric plants. Nevertheless, some hydropower has been generated in the Susquehanna basin for at least two human generations - since 1910 on the lower main stem of the river, and fully as long on the Juniata.

Consequently, when Congress authorized comprehensive surveys of the water and related land resources of the Susquehanna, it instructed that the power of falling water to generate electricity should be studied along with other resource factors. The Corps of Engineers is looking into this phase, with assistance from the Federal Power Commission, and active interest is being shown by the electric utilities that serve the basin. In fact, the president of one of the electric companies is a member of a hydropower subcommittee of the Susquehanna River Basin Study Coordinating Committee.

However, the extent to which hydropower will enter into the action program that is expected to follow completion of the study is anybody's guess; decisions affecting the entire basin likely will not be made for some years to come and until there has been full public discussion of the subject.

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SUPERHIGHWAYS AND RECREATION

For sound reasons we must expect greatly increased numbers of visitors to come to the Susquehanna basin in the near future. They'll travel to the basin seeking outdoor recreation. If we are realistic we will recognize that we can't escape it, and in some ways we shouldn't want to - but we'd better get ready for what's ahead.

Two things will bring these people. First is the fact that in parts of the Susquehanna basin - New York and Pennsylvania - are found some of the few sizable areas of available open space in the Middle Atlantic region that are still recreationally underdeveloped. Second is that day by day the superhighway construction program is bringing the basin closer and closer to millions of recreation-hungry people on our eastern Seaboard.

Nowadays people don't think so much about how far it is from home to a place where they can enjoy the kind of recreation they like. Instead, they tend to ask how long it will take to get there, and how much time they will have to enjoy their sport before they must start back.

It will help visualize what is to happen if we take a broad look at the road building program. Interstate 80, the Keystone Shortway, will be completed across Pennsylvania in 1968, and a number of fast highways feed into the Shortway from Greater New York. Interstate 84 opens the central basin region to lower New England by way of Scranton. In 1964 all but about twenty miles of New York Highway 17 had already been four-laned from New York City to Binghamton. The Northeast Extension of the Pennsylvania Turnpike has made much of the middle and upper basin easily accessible to Greater Philadelphia. Interstate 81 and 83

are opening the basin north and south. The Maryland portion of the lower basin is already heavily used for recreation, and is being made even more easily reached by new road construction.

It requires little imagination to see how the highways program can funnel increasing thousands of people into the Susquehanna country. The important ingredients to draw them are already present or rapidly taking shape. The recreational potential is there. The people are ready. And the roads that will let them reach the basin in a short space of time are being built as fast as earthmoving and concrete pouring machinery can work.

The basin will reap a golden harvest, if its people recognize the opportunity and meet the challenge of the times ahead. However, there is more to it than just standing back and listening to the tinkle of the bell on the cash register. There is work ahead for both public agencies and private enterprise, for each will have a hand in what is coming.

Public recreation areas already exist here and there in the basin, and others will be developed as the survey proceeds and as planning and action programs follow. There is a natural tendency for private enterprise to take advantage of the presence of public parks and forests and waters, and to build and operate many kinds of service establishments along entrance roads and around the perimeters. Here is one of the areas where local government needs to take a long, hard look at coming events, and to institute needed controls - even zoning - to assure that development is appropriate to location, and to try to guarantee that the recreational regions do not deteriorate into slumlike conditions.

Where public recreation areas already exist, local planning and governing agencies can proceed now to develop long range programs intended to bring lasting benefits. And in cases where new recreation

areas are to be established by federal or state action, local planning can and should be started as quickly as locations are firmly decided and made public.

There's another side to this coming burst of recreation seeking that we sometimes tend to shy away from and not discuss. Maybe we don't want every last acre of mountainside and valley and water in the basin overrun by people. If we are smart we will want to keep some of it just about the way nature shaped it - woods and flowers and mountain streams and scenery to look at and enjoy, and clean air to breathe; a few places not cluttered with manmade developments, not crowded with people.

Fortunately, farsighted officials long ago brought into existence the state parks and state forests systems of the basin states, and established substantial public reservations in the Susquehanna valley. They need not all be dedicated to mass recreational use; some areas can - if desired - be set aside as cells of solitude, as refuges from the tensions of modern living, where a man or woman may walk alone in a forest or beside a stream, in tune with nature.

But such things must be decided soon because time is running out. In another four or five years the heartland of the Susquehanna basin will be as near - timewise - to our Seaboard Megalopolis as were the Catskills and Poconos only four or five years ago. This shortened time element will bring Megalopolis to the Susquehanna. We had better get ready for it.

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SUPERHIGHWAYS AND THE ECONOMY

All through history the building of roads has stimulated new settlement, new business and industry. We have every reason to believe that will be true of the present program of constructing multi-lane superhighways that will criss-cross the Susquehanna river basin and make all its parts more accessible.

The new roads will open large areas of woodland and water to recreational development and use such as they have never experienced before. This seems sure to lead to the establishment of a wide variety of service businesses to cater to the people from nearby metropolitan areas who will come to the basin looking for outdoor recreation.

Recreation, however, is only one of many fields of business and industry to be stimulated by the improved roads system. Some of these undoubtedly will be located at or near interchanges, others along feeder roads and in communities with ready access to expressways.

The interchanges and feeder roads all have an effect on where people will live and the kinds of work they do for a living.

Interchanges are natural places to locate motels, restaurants, service stations and other service establishments that cater to the traveler.

Corporations moving into new areas to establish branch plants and other facilities have evolved elaborate sets of criteria that their specialists follow as they carefully examine numerous localities before coming to a decision. Good transportation connections are among the many factors they look into.

Many parts of the Susquehanna basin will be along expressways or

will have reasonable access to one or more of them by way of feeder roads.

It seems a fair statement to say that the total transportation pattern - including the better roads program as well as air transport and rail routes - will be taken into full consideration as the basin surveys proceed and a long range action program for conservation and use of its resources is developed.

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SMALL WATERSHEDS

The small watersheds part of the comprehensive surveys of the Susquehanna basin is being carried out by three agencies in the U.S. Department of Agriculture, with most of the work falling on the Soil Conservation Service. The others are the Forest Service and the Economic Research Service.

What is a small watershed? It is almost what you choose to call it, anything from the valley of a small spring run that flows entirely within a single farm, up to a collection of small streams that feed into a sizable creek or river - such as the Loyalsock or Bald Eagle in Pennsylvania, Deer Creek in Maryland, or the Unadilla in New York State. One of them may be small by comparison with our entire river basin, but some may run up to 50 square miles or more.

Specialists from Department of Agriculture agencies divided the feeder stream region into 89 subwatersheds to be studied individually. They are looking into such subjects as farm economics; the status of and the outlook for more and better soil and moisture conservation; what seems to be in the future for farm woodlots and other forest lands; even a certain amount of public water supply and irrigation. Flood control is an important part of the small watersheds study; so is outdoor recreation. Hundreds of small dams could be built in these tributary watersheds, and they'd hold back a lot of water that otherwise could cause damage in the main valley. A good many will undoubtedly be built to supplement flood control features of several existing Army Engineer dams including the one already built at Whitney Point, New York, the Corps dam now being constructed at Curwensville, Pennsylvania, and state-built impoundments.

When these 89 subwatersheds have all been studied, and the meaning of the study has been spelled out, it will all become part of the raw material from which eventually will come an action program for the entire Susquehanna Basin.

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FOREST LANDS OF THE BASIN

More than half of the 27,000 square miles of the Susquehanna River Basin are covered by forests - yet the timber resource is only a fraction of what it used to be in the economy of this part of the nation.

We Americans have used up a lot of trees in the last hundred and fifty years or so. Most of this time we weren't even half smart in the way we cut the trees to make our lumber, our tools, our furniture, to cook our food and keep our houses warm. We clearcut the best timber in many areas; all we left standing were the poorer grades and a few saplings.

During this time thoughtful foresters became more and more worried over what was happening, and petitioned for protective government action. New York has had a state forestry agency continuously since 1885, Pennsylvania since 1898, Maryland since 1906.

Government forest management is helping to safeguard vital watersheds in the basin; many of them are sources of public water supply. Natural processes, coupled with fire prevention and suppression and other management activities, have brought much of the state-owned timberlands back into production of saw logs and pulp wood. Increasing amounts can be and are being harvested selectively. Some areas, where soil conditions are poor and the loggers didn't leave much except scrub varieties of trees, won't see lumbermen around again for many years to come. Yet these same lands, poor as they may be for the production of saw logs, serve a worthwhile purpose in protecting watersheds, preventing erosion and the siltation of downstream areas, in producing habitat for game and fish, and the recreation man needs in order to enjoy life to the fullest.

These things - timber production, stand improvement, water supply protection, erosion control, better insoak of precipitation, recreation, hunting, fishing - are what foresters mean when they speak of the multiple use of forests. Multiple use means the management of timberland so it will produce as best it can as many different benefits to man as possible. It can be applied easier on large acreages such as state forest or game land. In most cases it can also be practiced profitably by the private owner of a woodlot - and if he needs help he can get state and federal experts to tell him how.

We keep hearing about new substitutes for wood and products made of wood, but man keeps on using wood in more volume and in new ways. The timber of the Susquehanna basin will take on increasing value as time passes - in producing wood products, in protecting watersheds, in helping to stabilize flow and keep streams clean, in furnishing habitat for game and fish, in making outdoor recreation of many kinds possible - and in these ways the total value of our Susquehanna basin forest resource is almost impossible to calculate. This will become abundantly clear as we get on with the comprehensive surveys of the basin's water and other resources.

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RECREATION AND FISH AND WILDLIFE

Outdoor recreation, in various forms, has a significant place in the Susquehanna basin. It is important now and seems destined to grow more so in times to come.

Much of this outdoor recreation - though far from all of it - is based on water. The presence or absence of recreational water, and its quality, quantity and accessibility, have become a vital part of modern living for millions of Americans.

The Susquehanna basin has some of the best water in the country from the viewpoint of the recreation seeker - and some of the worst. Fishing quality ranks high, except where man has downgraded it. Lower reaches of the river, including parts of Chesapeake Bay that are strongly influenced by the river, have some of our most famous waterfowl areas.

The basin's streams and lakes harbor most of the kinds of fish that are popular with anglers, and the river-influenced upper parts of the Bay are noted for their large numbers of both fresh and salt water species.

The North Branch of the river - in New York, and in Pennsylvania to the mouth of the Lackawanna - has been selected by an interdepartmental team of federal recreation specialists for study in connection with a proposal to establish a nationwide system of streams that would be allowed to flow freely, unimpeded by large manmade barriers. The proposal was made by a recent United States Senate Committee on National Water Resources, and it was advocated by a recent Presidential Commission on outdoor recreation resources. This is a new concept, untried, being tested for the first time to see if it should become a federal policy. As such, it should be weighed

carefully before it is either accepted or rejected. Nevertheless, the fact that a substantial part of the North Branch lived through exhaustive screening and was chosen for consideration in such a national setting, points up the recreational quality - actual and potential - that we have in this Susquehanna river valley.

As the current surveying and studying comes to an end and the existing water improvement and impoundment projects are augmented by new action programming, the water-based phases of outdoor recreation in the Susquehanna valley will increase and take on added significance for more and more people. They will be benefited and enhanced by the creation of additional recreational waters, by the assurance of more dependable flows in the streams, and by better water quality brought about through the abatement and control of pollution.

Land-based recreation also seems bound to experience an upsurge as an outcome of the efforts that are under way and that are to follow. There is upland and big game hunting. Much of the basin is scenically superb, and suited to a wide variety of open-weather recreational activities. Winter sports are becoming ever more popular.

Accessibility has been one of the chief drawbacks to making the heartland of the Susquehanna basin a Mecca for outdoor recreation. This also is changing, with new, fast expressways, and their feeder roads, bringing the basin ever closer to more people.

There is a danger in the improved accessibility, however, that must be recognized. The places made more accessible can become overcrowded, misused, and abused. Pennsylvania, in particular, and New York as well, are fortunate in the existence of sizable acreages of state-owned lands and waters where a degree of control can be exercised.

The federal Congress in 1964 recognized a national need for a system of wilderness areas, where nature in her purest form can be enjoyed by people who prefer this sort of outdoor recreation to the kinds that attract crowds and require manmade contrivances. There is a place - and room - for both in the Susquehanna basin.